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(6 spp.) and Phyllospadix (3 spp.); Posidonieae containing Posidonia (2 spp.); Potamogetoneae containing Potamogeton (89 spp., 1 new, and numerous hybrids) and Ruppia (1 sp.); Cymodoceae containing Cymodocea (7 spp.) and Diplanthera (2 spp.); and Zannichellieae containing Zannichellia (2 spp., 1 new) and Althenia (4 spp.).—J. M. C.

Giesenhagen's Lehrbuch.—The fourth edition of GIESENHAGEN'S *Textbook of botany* [5] is not essentially different from the third edition, which was reviewed in this journal.[6] A few details have been modified, a few figures added, and the text in general brought up to date. The most noticeable change is the presentation of current theories, which many botanists believe to be out of place in a textbook. The author, however, believes that important theories and problems, even though still lacking definite proof, are valuable if the presentation makes it clear that they are only theories.—CHARLES J. CHAMBERLAIN.

Plants of Bolivia.—The fourth part of the enumeration of Bolivian plants collected by MIGUEL BANG has been issued as a Bulletin of the New York Botanical Garden.[7] The previous parts appeared in the *Memoirs of the Torrey Botanical Club* in 1893, 1895, and 1896. The present part completes the enumeration with the exception of Gramineae, and contains descriptions of 227 new species. Three new genera are also characterized: *Tournefortiopsis* and *Poederiopsis* (both Rubiaceae), and *Vassobia* (Solanaceae).—J. M. C.

Genera Siphonogamarum.—The eleventh fascicle of DALLA TORRE and HARMS'S [8] list of the genera of seed-plants completes the work, the last entry being Zyzygium. There are included also title-page, preface, and list of families (290 in number).—J. M. C.

NOTES FOR STUDENTS

Morphology of bryophytes.—Several studies of bryophytes come to hand almost simultaneously. DACHNOWSKI[9] has been working again upon the much-studied *Marchantia polymorpha*. The growth of the rhizoids, the origin of dorsiventrality, the plagiotropic position, the formation of reproductive organs, and fertilization have been reexamined. His conclusions are in part like those of previous investigators and in part a slight modification of them. He finds moisture the most important factor in calling forth rhizoids. Dorsiventrality is fixed in 10–20 hours after sowing and "rests upon the reciprocal relation between determinative cooperating external factors and internal conditions of maturity"—the latter dependent in large measure upon the age of the gemmae. The plagiotropic position is a functional relation, influenced by illumination, and resulting from the cooperation of diaheliotropism and negative geotropism. Moisture and other variable external factors exercise a far greater influence than diageotropism, autogenous hyponasty, and photepinasty, to which it has been previously referred. As to reproductive structures, they seem to arise only when the plants are brightly illuminated, whereas weak illumination and much moisture permit only vegetative growth. Natural parthenogenesis was not observed.

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[5] GIESENHAGEN, DR. K., Lehrbuch der Botanik. Fourth edition with 561 illustrations. 8vo. pp. xiv+463. *figs. 561.* Stuttgart: Fr. Grub. 1907

[6] BOT. GAZETTE 37:225. 1904.

[7] RUSBY, HENRY H., An enumeration of the plants collected in Bolivia by MIGUEL BANG. Part 4. Bull. N. Y. Bot. Garden 4:309–479. 1907.

[8] DALLA TORRE, C. G. DE, and HARMS, H., Genera Siphonogamarum ad systema Englerianum conscripta. Fasc. 11. pp. 801–921. Leipzig: Wilhelm Engelmann. 1907. *M* 6.50.

[9] DACHNOWSKI, A., Zur Kenntnis der Entwicklungs-Physiologie von *Marchantia polymorpha*. Jahrb. Wiss. Bot. 44:254–286. *figs. 4. pl. 4.* 1907.

GYÖRFFY has had opportunity to study that curious hybrid, *Physcomitrella Hampei*, which has three forms, differing according to the male parent, *Physcomitrella patens* being in all cases the female parent. One of these is *P. patens*× *Physcomitrium sphaericum;* the second, *P. patens*×*Physcomitrium eurystomum;* and the third *P. patens*×*Physcomitrium pyriforme*, which GYÖRFFY himself discovered. He has made a comparative anatomical study of the first and third hybrid forms and of their parents. This is a paper that will be useful for the writer of a comparative anatomy of mosses, but for readers it is wordy and tiresomely detailed, and might easily have been compressed, to its advantage, into half the space. It seems hardly necessary in such a paper to describe the form of an archegonium and the mode by which the canal is opened for the sperm, when these do not have any peculiarities; the paper is full of such repetitious and irrelevant matter. This begins in the title, which is an excellent example of what a title ought *not* to be.[10] GYÖRFFY makes one particularly interesting observation, which is important if true; he figures the spore mother cells as capping the columella in *P. patens*. This is contrary to LIMPRICHT's observations, and as GYÖRFFY lays no special stress on the point, it seems doubtful if he appreciated its significance. In general he finds, as others have done, that the vegetative characters are those of *P. patens*, while the characters of the sporophyte are intermediate in certain respects. Thus the foot and the external form of the sporophyte of *P. Hampei* I are those of *P. sphaericum*, while the internal structure is more like that of *P. patens*. In *P. Hampei* III, strangely enough, the form of the capsule is like that of *P. Hampei* I, though the foot and long seat are those of *P. pyriforme*.

SERVIT discusses the mode of branching of the bryophytes,[11] supporting the novel views of VELENOVSKÝ,[12] which take no account of the source of branch initials, and determine morphological relationships merely by "how things look in the mature condition."

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[10] GYÖRFFY, I., Ueber die vergleichenden anatomischen Verhältnisse von *Physcomitrella patens* (Hedw.) Br. et Sch., *Physcomitrium pyriforme* (L.) Brid., *Physcomitrium sphaericum* (Ludw.) Brid., und *Physcomitrella Hampei* Limpr. [*Physcomitrella patens* (Hedw.) × *Physcomitrium sphaericum* (Ludw.), resp.: *Physcomitrella patens* (Hedw.) × *Physcomitrium pyriforme* (L.)]. Hedwigia **47**:1–59. 1907.

[11] SERVIT, M., Ueber die Verzweigungsart der Muscineen. Beihefte Bot. Cent. **22**^{1}:287–293. *figs. 3*. 1907.

[12] VELENOVSKÝ, J., Vergleichende Morphologie **1**:130. Prag. 1905.

SERVIT extends VELENOVSKÝ'S "angular leaf" idea from pteridophytes to bryophytes, and describes such a leaf in Mastigobryum, where it is easily distinguished by its transverse insertion as well as by its form. It is situated at the base of two branches and he considers it as formed by the concrescence of the first leaf of both. This angular leaf, he says, is present in all liverworts whose branches arise from the half-segment; but it is elsewhere not so typical (this sounds Goethean) as in Mastigobryum. It is lacking in those whose branches arise only from the basiscopic part of the half-segment.

In intercalary branching both of liverworts and mosses the branch is endogenous and breaks through a sheath, which may be split into segments that SERVIT calls *Blättchen*. He has confirmed in all cases VELENOVSKÝ'S "law" (that the branches in mosses arise without exception in the axil of the leaf below them!) by examining "extraordinarily abundant material;" but he does not say that in any case he has determined the relation of the branch initial to the leaf initial. Until that is done the current view, which rests upon careful studies of LEITGEB, will prevail.

BUCH has made a thorough study of the two modes of vegetative propagation of *Blasia pusilla*,[13] especially of the development and germination of the gemmae produced in the flasklike receptacles. These arise both on male and female plants, but are rare on the latter if they form embryos. While the brood-buds (modified tips) are the chief means of propagation in summer, the gemmae probably do not germinate in the summer and certainly not in the autumn, but hibernate and start new plants in the spring. Shoots arise from either side (seldom both), where there is a zone of four small cells. One of the upper two produces a thallus initial by three successive divisions of the protruded tube, while the two lower ones produce rhizoids.—C. R. B.

Mutations of Oenothera.—MACDOUGAL[14] and his collaborators have published a further account of evolutionary studies upon the Oenotheras. Taxonomic descriptions of several of the mutants from *O. Lamarckiana*, as they grew in the New York Botanical Garden, are given, including *O. albida*, *O. oblonga*, *O. scintillans*, *O. brevistylis*, and *O. lata*. These will be valuable for comparison with cultures elsewhere. The English "*O. biennis*," as growing in the vicinity of Liverpool, has been found to be *O. Lamarckiana*, and growing wild with it are two of the mutants, *O. rubrinervis* and *O. lata*, the latter maturing pollen, contrary to its habit elsewhere. The cultures of *O. Lamarckiana* from DEVRIES' seeds gave six of the mutants described by that author and also nine other types which could

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[13] BUCH, H., Ueber die ungeschlechtliche Vermehrung von *Blasia pusilla* (Mich). L. Öfvers. Finska Vet. Soc. Förhdl. **49**: no. 16. pp. 42. *pls. 2. figs. 7.* 1907.

[14] MACDOUGAL, D. T., VAIL, A.M. and SHULL, G. H., Mutations, variations, and relationships of the Oenotheras Carnegie Institution of Washington, Publ. no. 81. pp. 92. *pls. 22. figs. 73.* 1907.